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Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/690,675	Applicant(s) TARANCON, GREGORIO	
	Examiner Edna Wong	Art Unit 1753	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) 14-36 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☒ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input checked="" type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. <u>9/15/04</u> |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)                                 |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____.  |

***Election/Restrictions***

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims **1-13**, drawn to a method of treatment of chemical impurities in used CFC-113 using a photochemical reaction; a method of treatment of chemical impurities in used chlorofluorocarbon fluid using a photochemical reaction; a method of treatment of chemical impurities in used fluorocarbon fluid using a photochemical reaction; and a method of treatment of hydrochlorofluorocarbon fluids using a photochemical reaction, classified in class 205, subclass 158.21.
- II. Claims **14-36**, drawn to a photochemical reactor for transforming a reactant fluid by employing a photochemical reaction, classified in class 422, subclass 186.3.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the process as claimed can be practiced by another materially different apparatus such as a *photocatalytic* reactor.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction

for examination purposes as indicated is proper.

Because these inventions are distinct for the reasons given above and the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper.

During a telephone conversation with Ezra Sutton on September 9, 2004 a provisional election was made without traverse to prosecute the invention of Group I, claims 1-13. Affirmation of this election must be made by applicant in replying to this Office action. Claims 14-36 withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

#### ***Oath/Declaration***

The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

The oath or declaration is defective because it does not identify the citizenship of each inventor.

#### ***Specification***

Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract

on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

I. The abstract of the disclosure is objected to because the abstract is more than 150 words. Correction is required. See MPEP § 608.01(b).

II. The disclosure is objected to because of the following informalities:

page 2, line 17, the words "Cycle pentane" should be amended to the word --Cyclopentane --.

page 2, line 17, it is unclear what is meant by "Hefluorochlorobutane".

page 2, line 20, the word "Trifluorochloroeathane" should be amended to the word -- Trifluorochloroethane --.

page 2, line 27, it is unclear what is meant by --Difluorobromothane --.

page 3, line 4, the word "Octafluorocylebutane" should be amended to the word - Octafluorocyclobutane --.

page 3, line 6, the word "Hexafluorocyclebutene" should be amended to the word -- Hexafluorocyclobutene --.

page 5, line 22, the word "hydroflourocarbons" should be amended to the word -- hydrofluorocarbons --.

page 10, line 15, it is suggested that the word -- of -- be inserted after the word "transforming".

page 11, line 3, it is suggested that the word -- patent -- be deleted.

page 13, line 18, reference character "28" has been used to designate both the drain port and the gas loading port (from 13, line 16). It is unclear what reference character "28" designates.

page 14, line 16, the word -- are -- should be inserted after the word "impurities".

page 14, line 17, reference character "34" has been used to designate both the gas receiving port and the vacuum, vent or pressure port (from page 11, line 4). It is unclear what reference character "34" designates. See also page 16, lines 3-4; page 17, line 17; and page 19, lines 2-3.

Appropriate correction is required.

The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

### ***Claim Objections***

Claims **7 and 11-13** are objected to because of the following informalities:

#### Claim 7

line 6, the word -- the -- should be inserted after the word "containing".

line 10, the word -- light -- should be inserted after the word "ultraviolet".

#### Claim 11

line 10, the word -- light -- should be inserted after the word "ultraviolet".

#### Claim 12

line 8, the word -- light -- should be inserted after the word "ultraviolet".

Claim 13

line 8, the word -- light -- should be inserted after the word "ultraviolet".

line 8, the word "region" should be amended to the word -- regions --.

line 11, the word "flourine" should be amended to the word -- fluorine --.

Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

I. Claims **1-13** are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for *lamps in the visible or ultraviolet light region*, does not reasonably provide enablement for *lamps in the visible and ultraviolet regions*. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to use the invention commensurate in scope with these claims.

Claim 1, line 10; claim 5, line 11; claim 6, line 10; claim 7, line 10, claim 11, line 10; claim 12, line 8; and claim 13, line 8, recite "lamps in the visible and ultraviolet light regions". However, Applicant's specification, examples and drawings do not positively disclose that lamps in **both** the visible and ultraviolet regions are used at the same time as presently claimed. Thus, the claims as presently written are not commensurate in



scope with Applicant's specification.

II. Claims **1-6 and 9-10** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1

line 3, "the hydrogen-carbon bonds" lack antecedent basis.

line 6, it appears that the "used CFC-113" is the same as that recited in claim 1, line 1. However, it is unclear if it is. If it is, then it is suggested that the word -- the -- be inserted after the word "placing".

line 12, "said hydrogen-carbon bonded molecules" lack antecedent basis.

Claim 5

line 3, "the hydrogen-carbon bonds" lack antecedent basis.

line 6, it appears that the "used CFC" is the same as that recited in claim 5, line 1. However, it is unclear if it is. If it is, then it is suggested that the word -- the -- be inserted after the word "placing".

line 10, "said halogen gas" lacks antecedent basis.

line 13, "said hydrogen-carbon bonds of said molecules" lack antecedent basis.

line 14, it appears that "a halogen gas" is the same as the halogen fluid recited in claim 5, line 8. However, it is unclear if it is.

#### Claim 6

line 5, it appears that the "used FC" is the same as that recited in claim 6, line 1. However, it is unclear if it is. If it is, then it is suggested that the word -- the -- be inserted after the word "placing".

#### Claim 9

line 6, "said chlorine atoms" lack antecedent basis.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

I. Claim 5 is rejected under 35 U.S.C. 102(b) as being anticipated by **Bertocchio**

**et al.** (US Patent No. 5,951,830).

Bertocchio teaches a method of treatment of chemical impurities in used chlorofluorocarbon (CFC) fluid (= crude F133a = crude 1-chloro-2,2,2-trifluoroethane) using a photochemical reaction, wherein the chemical impurities are molecules that have hydrogen atoms in the hydrogen-carbon bonds (= C<sub>4</sub> impurities) [col. 3, lines 42-64], and the used CFC fluid and the chemical impurities form an azeotropic or pseudoazeotropic mixture (col. 1, lines 53-56), comprising the steps of:

(a) placing the used CFC fluid containing the chemical impurities into a photochemical reactor (= cylindrical jar) having a process compartment (Pyrex glass coil) [cols. 4-5, Example 1];

(b) placing halogen fluid into said photochemical reactor, wherein said halogen fluid is chlorine (Cl<sub>2</sub>) [= gaseous chlorine] (col. 4, line 58);

(c) irradiating said used CFC fluid and said halogen gas using radiant energy from lamps in the visible and ultraviolet light regions of the electromagnetic spectrum to conduct thermolysis, photolysis and photochemical treatment (col. 2, lines 59-65);

(d) halogenating said hydrogen-carbon bonds of said molecules in said chemical impurities with a halogen gas to form halogenated chemical impurities during a dwell time period (= 720 seconds) [col. 4, lines 62-64] for elimination of said azeotropic mixture (col. 4, lines 5-13), and

(e) removing said halogenated impurities by physical means, wherein said physical means include standard process techniques of physical separation (=

distillation) [col. 4, lines 14-20].

II. Claim 6 is rejected under 35 U.S.C. 102(b) as being anticipated by **Braun et al.** (US Patent Application Publication No. 2002/0125122 A1).

Braun teaches a method of treatment of chemical impurities in used fluorocarbon (FC) fluid (= 1,1,1,3,3-pentafluorobutane) using a photochemical reaction, wherein the chemical impurities are molecules which contain one or more double bonds (=  $C_4ClF_3H_4$ ), and the used FC fluid and the chemical impurities form an azeotropic or pseudoazeotropic mixture, comprising the steps of:

(a) placing the used FC fluid containing the chemical impurities into a photochemical reactor having a process compartment (= 100-ml Durant glass flask);

(b) placing halogen fluid into said photochemical reactor, wherein said halogen fluid is chlorine ( $Cl_2$ );

(c) irradiating said used FC fluid and said halogen fluid using radiant energy from lamps in the visible and ultraviolet light regions of the electromagnetic spectrum to conduct thermolysis, photolysis and photochemical treatment (page 1, [0012]);

(d) halogenating said double bonds of said molecules in said chemical impurities during a dwell time with said halogen fluid to form halogenated chemical impurities during a dwell time period (= overnight) for elimination of said azeotropic mixture (= photochlorination) [page 2, [0023]]; and

(e) removing said halogenated impurities by physical means, wherein said

physical means include standard process techniques of physical separation (= distillation) [page 3, [0042]; and pages 2-3, Example 12].

**III.** Claim **12** is rejected under 35 U.S.C. 102(b) as being anticipated by **Ohtake et al.** (US Patent No. 5,714,665).

Braun teaches a method of treating hydrofluorocarbon (HCFC) fluids using a photochemical reactor **4**, wherein the HCFC molecules contain a hydrogen atom and a halogen atom on the same carbon of the HCFC molecule (col. 3, line 67), comprising the steps of:

(a) placing said HCFC fluid into a photochemical reactor **4** having a process compartment (col. 10, lines 17-23);

(b) placing oxygen (O<sub>2</sub>) fluid or air into said photochemical reactor (col. 8, lines 29-42);

(c) irradiating said HCFC fluid and said oxygen fluid or air using radiant energy from lamps in the visible and ultraviolet light regions of the electromagnetic spectrum to conduct thermolysis, photolysis and photochemical treatment (col. 2, lines 31-48; and col. 12, lines 25-43);

(d) reacting the hydrogen atom and halogen atom of said molecules of said HCFC fluid with said oxygen (O<sub>2</sub>) fluid or air by oxygenation to form an acetyl fluid during a dwell time period (*inherent*); and

(e) removing said acetyl fluid from said HCFC fluid by standard process

techniques of physical separation (col. 15, lines 9-20).

**IV.** Claim **13** is rejected under 35 U.S.C. 102(b) as being anticipated by **Ohtake et al.** (US Patent No. 5,714,665).

Braun teaches a method of treating hydrofluorocarbon (HFC) fluids using a photochemical reactor **4**, wherein the HFC molecules contain a hydrogen atom and a halogen atom on the same carbon of the HFC molecule (col. 4, line 1), comprising the steps of:

(a) placing said HFC fluid into a photochemical reactor **4** having a process compartment (col. 10, lines 17-23);

(b) placing oxygen fluid or air into said photochemical reactor (col. 8, lines 29-42);

(c) irradiating said HFC fluid and said oxygen fluid or air using radiant energy from lamps in the visible and ultraviolet light regions of the electromagnetic spectrum to conduct thermolysis, photolysis and photochemical treatment (col. 2, lines 31-48; and col. 12, lines 25-43);

(d) reacting by methatesis of oxygen by substitution of an atom of hydrogen and an atom of fluorine from the same carbon with oxygen fluid and thereby forming an acetyl fluid (*inherent*); and

(e) removing said halogenated impurities by physical means, wherein said physical means include standard process techniques of physical separation [col. 15,

lines 9-20].

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

I. Claim **7-10** are rejected under 35 U.S.C. 103(a) as being unpatentable over **CS 177645**.

The CS reference teaches a method of treatment of chemical impurities (= contaminants) in used CFC-113 fluid (= technical 1,1,2-trifluorotrichloroethane) using a photochemical reaction and the used CFC-113 fluid and the chemical impurities form an azeotropic or pseudo-azeotropic mixture, comprising the steps of:

(a) placing the used CFC-113 fluid containing chemical impurities into a photochemical reactor having a process compartment;

(b) placing oxygen (O<sub>2</sub>) fluid or air into said photochemical reactor;

(c) irradiating said used CFC-113 fluid and said oxygen fluid or air using radiant energy from lamps in the visible and ultraviolet regions of the electromagnetic spectrum to conduct thermolysis, photolysis and photochemical treatment;

(d) reacting said chemical impurities with said oxygen (O<sub>2</sub>) fluid or air by oxygenation to form oxidized chemical impurities during a dwell time period for the

elimination of said azeotropic mixture (*inherent*); and

(e) removing said oxidized chemical impurities from said used CFC-113 fluid by physical means, wherein said physical' means include standard process techniques of physical separation (= distillation) [abstract].

The CS reference does not teach wherein the chemical impurities are molecules which contain a hydrogen atom and a halogen atom on the same carbon of the molecule.

However, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of the CS reference with wherein the chemical impurities are molecules which contain a hydrogen atom and a halogen atom on the same carbon of the molecule because the kinds of molecules of the chemical impurities would have depended upon the source of the technical product. For example, CFC, which has been used in freezers, refrigerators, air-conditioners, aerosols and in washing of electronic parts or for dry cleaning, would have contained different kinds of molecules of chemical impurities.

As to (a) processing said used CFC-113 fluid in said photochemical reactor at an operating pressure in the range from a vacuum of 1mmHg to 20 atmospheres, at an operating temperature from -100°C to +100°C and at an operating radiant energy level



in the region of the electromagnetic spectrum from 240nm to 720nm, the CS reference teaches ultraviolet light (= 10-400 nm) and a temperature of 12-46 °C (abstract). The pressure is a result-effective variable and one skilled in the art has the skill to calculate the pressure that would determine the success of the desired reaction to occur, absent evidence to the contrary. MPEP § 2141.03 and § 2144.05(b).

As to (a) pumping said used CFC-113 fluid from an inventory receiver tank to said process compartment of said photochemical reactor, such that a circulation pump is used to circulate said used CFC-113 fluid between said process compartment and said receiver tank until all of said hydrogen atoms and said chlorine atoms are substituted by said oxygen fluid within said process compartment of said photochemical reactor, circulating the fluid between two tanks is a conventional arrangement of continuously operating a photochemical reactor.

It is well within the skill of the artisan to carry out the photochemical treatment until all of said hydrogen atoms and said chlorine atoms are substituted by said oxygen fluid.

As to (a) reacting said used CFC-113 fluid in said process compartment for said dwell time period in the range of 1 hour to 100 hours, depending upon the concentration of said chemical impurities of said used CFC-113 fluid, the CS reference teaches a dwell time period of 3-6 hours (abstract). The dwell time period would have been

dependent upon the concentration of said chemical impurities of said used CFC-113 fluid because the irradiation would have been carried out until the all of the chemical impurities has been oxygenated.

II. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over **CS 177645**.

The CS reference teaches a method of treatment of chemical impurities (= contaminants) in used chlorofluorocarbon (CFC) fluid (= technical 1,1,2-trifluorotrchloroethane) using a photochemical reaction and the used CFC fluid and the chemical impurities form an azeotropic of pseudo-azeotropic mixture, comprising the steps of:

- (a) placing the used CFC fluid containing chemical impurities into a photochemical reactor having a process compartment;
- (b) placing oxygen (O<sub>2</sub>) fluid or air into said photochemical reactor;
- (c) irradiating said used CFC fluid and said oxygen fluid or air using radiant energy from lamps in the visible and ultraviolet regions of the electromagnetic spectrum to conduct thermolysis, photolysis and photochemical treatment;
- (d) reacting said chemical impurities with said oxygen (O<sub>2</sub>) fluid or air by oxygenation to form oxidized chemical impurities during a dwell time period for the elimination of said azeotropic mixture (*inherent*); and
- (e) removing said oxidized chemical impurities from said used CFC fluid by

physical means, wherein said physical' means include standard process techniques of physical separation (= distillation) [abstract].

The CS reference does not teach wherein the chemical impurities are molecules which contain a hydrogen atom and a halogen atom on the same carbon of the molecule.

However, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of the CS reference with wherein the chemical impurities are molecules which contain a hydrogen atom and a halogen atom on the same carbon of the molecule because the kinds of molecules of the chemical impurities would have depended upon the source of the technical product. For example, CFC, which has been used in freezers, refrigerators, air-conditioners, aerosols and in washing of electronic parts or for dry cleaning, would have contained different kinds of molecules of chemical impurities.

#### ***Allowable Subject Matter***

The following is a statement of reasons for the indication of allowable subject matter:

Claims 1-4 define over the prior art of record because the prior art does not teach or suggest a method of treatment of chemical impurities in used CFC-113 fluid using a

photochemical reaction, wherein the chemical impurities are molecules that have hydrogen atoms in the hydrogen-carbon bonds and the used CFC-113 fluid and the chemical impurities form an azeotropic or pseudoazeotropic mixture, comprising the steps of: (a) placing, (b) placing, (c) irradiating, (d) halogenating and (e) removing as presently claimed, esp., the step of (b) placing halogen fluid into said photochemical reactor.

The prior art does not contain any language that teaches or suggests the above. CS 177645 does not teach placing a halogen fluid into said photochemical reactor. Therefore, a person skilled in the art would not have been motivated to adopt the above conditions, and a prima facie case of obviousness cannot be established.

Claims 1-4 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 1<sup>st</sup> and 2<sup>nd</sup> paragraphs, set forth in this Office action.

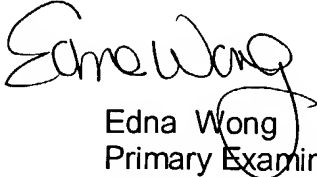
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edna Wong whose telephone number is (571) 272-1349. The examiner can normally be reached on Mon-Fri 7:30 am to 3:30 pm, Flex Schedule.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only.

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Edna Wong  
Primary Examiner  
Art Unit 1753

EW  
September 16, 2004